|  |  |  |
| --- | --- | --- |
| **VOCABULARY**  **Visual Arts**:   * **Collage** - a piece of art made by sticking various different materials such as photographs and pieces of paper or fabric onto a backing. * **Neoplasticism** – A style of painting developed by Piet Mondrian that uses asymmetry, vertical and horizontal lines, quadrilaterals, black, white and primary colors. * **Primary colors** – Red, Yellow and Blue * **Installation art** – an artwork assembled within a gallery, an arrangement of separate components.   **Mathematics**:   * **Factors** - The numbers or terms multiplied in an expression. * **Distributive Property** - A property that establishes a relationship between multiplication and addition such that multiplication distributes across the addition [i.e., a(b+c) = ab + ac]. * **Multiplicands** – A number that is multiplied by another number. * **Multiplier** – The number by which another number is multiplied. * **Product** – the result of a multiplication; a multiple of the factors or multiplicands; the number or quantity obtained by multiplying two or more numbers together. * **Commutative property** – A property of multiplication in which the product stays the same when the order of the factors is changed (i.e., ab = ba). * **Place value** - The value of a digit as determined by its position in a number (e.g., in the number "11" the one is worth either 10 or 1, depending on the position). * **Vedic** - Relating to the Veda or Vedas, the most ancient Hindu scriptures. | | |
| **MATERIALS & RESOURCES FOR THE CLASSROOM**  **General:**   * Handouts * Images of works of art * Projector and screen * Five “Point-and shoot” cameras + video (for documentation)   Cameras should have new or charged batteries and empty memory cards.   * One USB flash card reader that supports many cards formats. * One strip-cut paper shredder * Three dozen #2 pencils (item 711382 - Staples #2 Yellow Pencils – [www.staples.com](http://www.staples.com)) * One ream of white 8 ½” x 11” copy paper (item 503199 Staples Multipurpose Paper – [www.staples.com](http://www.staples.com).   **For collage:**   * One ream (100 sheets) of 11” x 17” Eclipse black copy paper (item SKU 571110 Wausau – [www.11x17.com](http://www.11x17.com) - phone # 903-541-0100) * Two hundred (25 sheets/carton) 8 ½” x 11” white non-adhesive foam core board thickness 3/16” ([www.uline.com](http://www.uline.com)) * Eight packs of Avery Round ¾” diameter Print & Write color coding labels, assorted colors (item 297705 – [www.staples.com](http://www.staples.com)) * Twenty four glue sticks (item 390848 Avery clear glue sticks, 6/pack – [www.staples.com](http://www.staples.com)) * Three rolls of blue painter’s Tape (model 240193 - Duck 0.94 x 60 yd. Blue Clean Release Masking Tape - <http://www.homedepot.com>) * Twenty pairs of scissors (item 229690 – Westcott All Purpose Value Scissors, 8” bent –[**www.staples.com**](http://www.staples.com)**)** | | |
| **MATERIALS & RESOURCES FOR THE TEACHER**  <http://youtu.be/9fmiKOOvLUo>  <http://youtu.be/pOYuEUkE06I> | | |
| **PRIOR KNOWLEDGE**  **Visual Arts**  Knowledge of Mondrian’s work  **Mathematics**  Multiplication of natural numbers | | |
| **PROCEDURES:**  **MOTIVATION/INTRODUCTION** | | |
| **WHO IS DOING IT?**  **T**  Teachers  **TA**  Teaching  Artist  **S**  Students | **T/TA**  **TA**  **S**  **TA** | 1. Distribute pre-survey form. 2. Introduce the essential question. 3. Explain how to use the pre-survey form and bar graph. 4. Student place their name on the post-it and place it on a bar graph prepared by the TA. The post-it should be placed on the place that matches their answer. 5. Use digital camera to photograph the completed bar graph. The bar graph is a numeric representation of student’s previous knowledge (classroom knowledge.) At the end of the lesson, the bar will be compared with the results of the post-survey. The photos document the results. 6. Explain to students how they will be using photo and video cameras to record small group discussions. T and TA will record student’s work. 7. Introduce lesson objectives |
| **MODELING AND GUIDED PRACTICE** | | |
| **WHO IS DOING IT?**  **T**  Teachers  **TA**  Teaching  Artist  **S**  Students | **T/TA**  **TA**  **S**  **T/TA**  **S** | 1. Introduce and project video about the progress of Mondrian’s work <http://youtu.be/9fmiKOOvLUo> 2. Introduce and project video about Vedic multiplication   <http://youtu.be/pOYuEUkE06I>   1. Remind students that a step-by step explanation of Vedic multiplication is part of this packet (page 7). 2. Project image of Mondrian’s *Composition with Yellow, Blue and Red -*1937-42 side-by-side with the image of a Vedic multiplication **41 x 23 = 943.** 3. Instruct students to go to page 11 of this packet, and use a Venn diagram to compare and contrast Mondrian’s work with an example of Vedic multiplication. Explain activity. 4. Student use Venn diagram to compare and contrast Mondrian’s work with an example of Vedic multiplication and list details as differences and similarities 5. Present collages, weaves and digital images of work based on Mondrian and on Vedic multiplication. 6. Explain that since Vedic multiplication is visual, it is possible to use its images to create artworks that follow Mondrian’s neoplastic art model. 7. Project Mondrian’s criteria for Neoplasticism. 8. Demonstrate the collage technique. 9. Ask students to individually select two two-numbers from 11 to 45 (this interval is arbitrary and may be different when you teach the lesson.) 10. Show how to use collage to create artwork that demonstrates the commutative property of multiplication. 11. Distribute supplies (Ahead of time, cut black paper strips with paper shredder) 12. Position white foam core (backing) with the longest side parallel to the edge of the table (landscape orientation). 13. Place - **but don’t glue** - black paper strips on the backing to represent the multiplicand. 14. Use diagrams on pages 7-9 to check for accuracy. 15. Glue black strips to chosen positions: 16. Place black paper strips on top of a white copy paper and gently spread glue all over it. 17. Lift black paper strip from white copy paper. 18. Place black paper strip – white the glue side down – on the chosen position. 19. Similarly, place, and the glue, black paper strips to represent the multiplier. Make sure that the multiplier goes perpendicular to the multiplicand and reads from bottom to top. 20. Add the sticky dots to the line intersections: 21. Use a loose black paper strip as your “imaginary” line (page 8) to define the oblique areas related to different “place values”. 22. Use red dots for “ones”, blue dots for “tens”, yellow dots for “hundreds” and green dots for “thousands”. 23. **Remember the “measure twice – cut once” rule: the sticky dots are not removable…** It is important know where to place the dots before you glue them! |
| **INDEPENDENT PRACTICE** | | |
| **WHO IS DOING IT?**  **T**  Teachers  **TA**  Teaching  Artist  **S**  Students | **S**  **TA**  **S**  **TA** | 1. Go through the same process to create a second collage to prove the commutative property of multiplication   .   1. Instruct students to “think, pair and share”: 2. When creating their collages, students were “thinking” about their choices and the process. 3. Ask students to pair themselves with a partner and to look at each other’s work. 4. Before any discussion, partners should be able to identify the multiplicand, the multiplier, and determine the product of each other’s work. 5. For assessment of the partner’s artwork, students use rubric on page 12. 6. Follow TA’s instructions described above 7. Lead discussion about students work 8. Lead discussion about how to installation classroom work. The installation should result from discussion around the following questions: 9. Should the work be installed randomly or in a pre-determined order? 10. What are the advantages of having a random installation? 11. What are the advantages of having a pre-determined order? 12. If a pre-determined order is selected, is everyone aware of the rules? 13. What are the reasons that justify the selection of the way that the collages will be installed? 14. Use blue tape to temporarily place Installation on the wall |
| ASSESSMENT | | |
| **Pre-survey –** quick poll of previous knowledge (post-it and photo camera)  **Informal assessment –** observation and documentation of small-group and whole- classroom discussion  **Rubric**  **Constructed responses** on protocol and exit ticket  **Performance based Task –** Product, collage, Vedic multiplication  **Post-survey –** quick poll of acquired knowledge (post-it and photo camera)  A private Wiki page will have the content of the lessons, including handouts, worksheets, assessment tools, references, photos, videos, discussion-pages, exemplars of activities completed by participants, pre- and post-surveys. | | |
| CLOSURE REFLECTION AND ACTIVITIES | | |
| **WHO IS DOING IT?**  **T** Teachers  **TA** Teaching  Artist  **S** Students | **TA**  **S** | 1. Lead reflection on how the elements of art and principles of design were used to create artwork and to represent details in both the collage and in the Vedic multiplication process. 2. How do the elements of art and principles of design represent details in the artwork? 3. How do the principles of art and elements of design represent details in the Vedic multiplication process? 4. How do artists and mathematicians “paint” details? 5. Student use exit ticket to answer the essential question: How do artists and mathematicians “paint” details? |
| LESSON ADAPTATIONS | | |
| The activities in this lesson can be used to create art inspired by mathematics, multiplication tables, transformations, etc. | | |

**Pre – Survey**

(Previous knowledge)

**1.** Write your name on a **blue post-i**t and place it on the **bar graph** to answer the following question:

**How much do you know about how artists and mathematicians “paint” details?**

Place your **blue post-it** on the bar that best describes how much you know:

**Beginner**

“I don’t know how artists and mathematicians “paint” details.”

**On its way**

“I know some of the ways artists and mathematicians “paint” details**”**

**Expert**

“I know a great deal about how artists and mathematicians “paint” details.”

**2.** Write your name on a **yellow post-it** and place it on the **bar graph** to answer the following question:

**How able are you to create an artwork with elements of art and principles of design?**

Place your **yellow post**-on the bar that best describes how much you know:

**Beginner**

“I am unable to create an artwork with elements of art and principles of design and still don’t know what they are.”

**On its way**

“I am unable to create an artwork, but able to use the elements of art and principles of design.**”**

**Expert**

“I am able to create an artwork with elements of art and principles of design.”

**3.** Write your name on a **red post-i**t and place it on the **bar graph** to answer the following question:

**How much do you know about multiplication, multiplicand, multiplier, product and the commutative property?**

Place your **red post-it** on the bar that best describes how much you know:

**Beginner**

“I don’t knowabout multiplication, multiplicand, multiplier, product and the commutative property.”

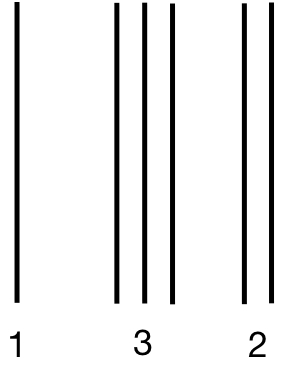
**On its way**

“I know some facts about multiplication, multiplicand, multiplier, product and the commutative property.”

**Expert**

“I know a great deal about multiplication, multiplicand, multiplier, product and the commutative property.”

VEDIC MULTIPLICATION

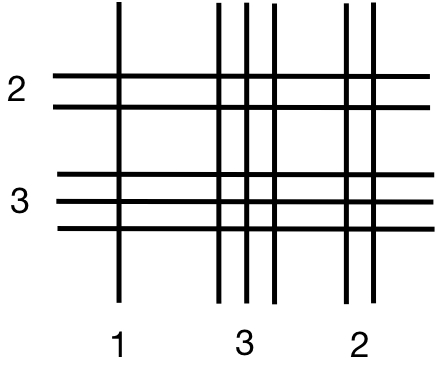


Draw vertical lines to represent

the **multiplicand** -**132**.

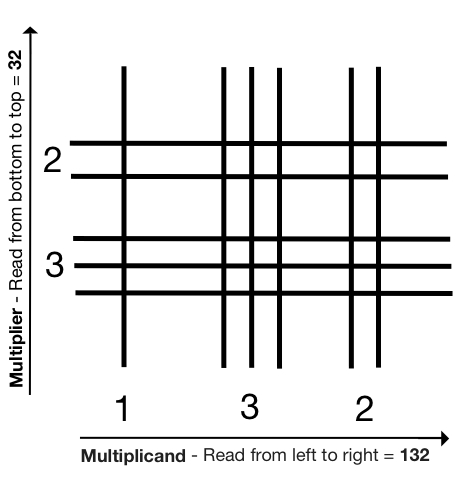
Each Integer equals a corresponding

number of lines.



Draw perpendicular lines to represent

the **multiplier** – **32.**

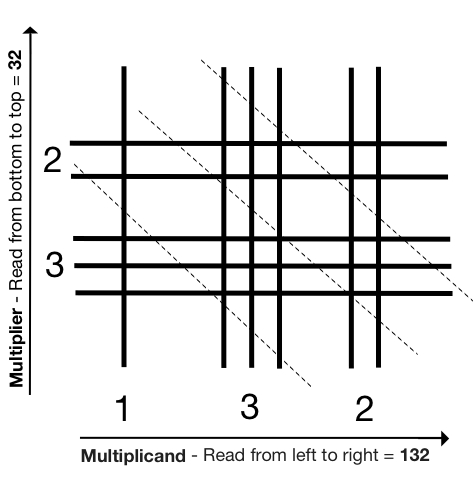


The multiplicand is read from

**left to right.**

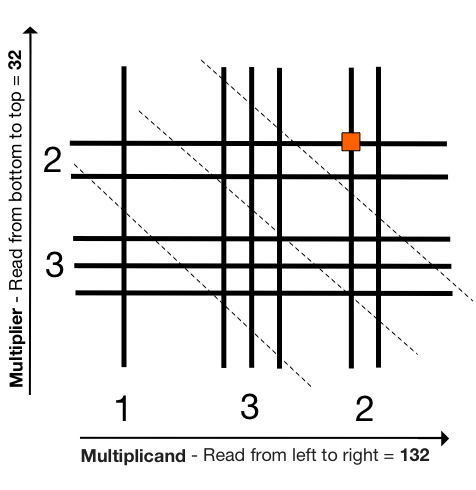
The multiplier is read from

**bottom to top**.



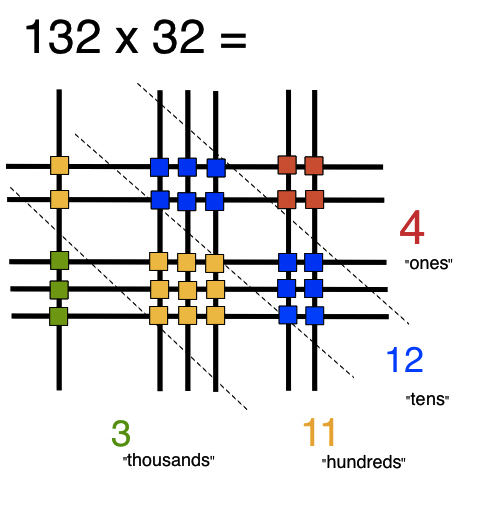
Imagine oblique lines that divide the

space into oblique rows of line intersections. Each oblique row will represent a **place value.**



When we move down-wards

(perpendicular to the top/right imaginary line), we move from “ones” to “tens”, then to “hundreds” and so on…

Mark intersections:

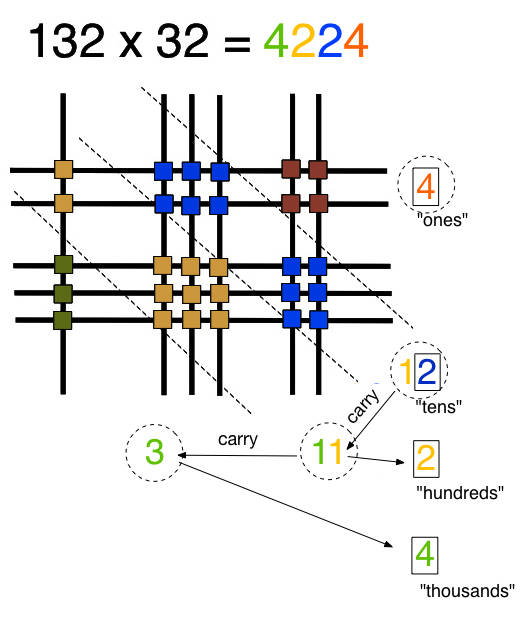
“Ones” - red;

“Tens” - blue

“Hundreds “ - yellow

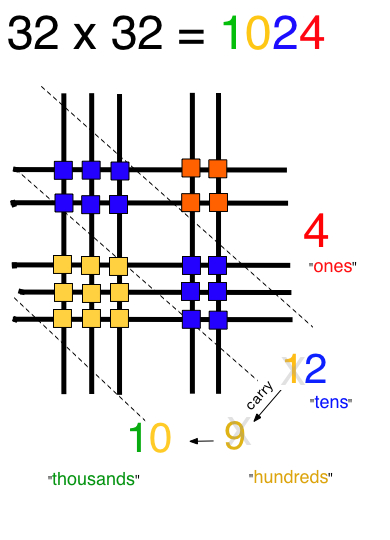
“Thousands” - green

Add the number of intersections on each oblique space (place value).



The intersections represent the **product:**

* + - **4 “ones”**
    - **12 “tens” –** we keep **2** in the “tens” space and move **1** to the “hundreds” space
    - **11 “hundreds” + 1 = 12** – we keep **2** in the “hundreds” and move **1** to the “thousands” space
    - **3 “thousands” + 1 = 4**



Explain how this multiplication was done, as explained on previous page:

**“Ones” –**

**“Tens”-**

**“Hundreds” -**

**“Thousands” -**

Mondrian vs Vedic multiplication

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**Post – Survey**

(Acquired knowledge)

**1.** Write your name on a **blue post-i**t and place it on the **bar graph** to answer the following question:

**How much do you know about how artists and mathematicians “paint” details?**

Place your **blue post-it** on the bar that best describes how much you know:

**Beginner**

“I don’t know how artists and mathematicians “paint” details.”

**Learning**

“I know some of the ways artists and mathematicians “paint” details**”**

**Expert**

“I know a great deal about how artists and mathematicians “paint” details.”

**2.** Write your name on a **yellow post-it** and place it on the **bar graph** to answer the following question:

**How able are you to create an artwork with elements of art and principles of design?**

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“I am unable to create an artwork with elements of art and principles of design and still don’t know what they are.”

**Learning**

“I am unable to create an artwork, but able to use the elements of art and principles of design**”**

**Expert**

“I am able to create an artwork with elements of art and principles of design.”

**3.** Write your name on a **red post-i**t and place it on the **bar graph** to answer the following question:

**How much do you know about multiplication, multiplicand, multiplier, product and the commutative property?**

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**Learning**

“I know some facts about multiplication, multiplicand, multiplier, product and the commutative property.”

**Expert**

“I know a great deal about multiplication, multiplicand, multiplier, product and the commutative property.”

